The taxonomic status of Leptodontium styriacum (Jur. ex Geh.) Limpr.

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Abstract: Leptodontium styriacum shall be distinguished from the closely related L. flexifolium by the frequent occurrence of gemmae, leaves ending in a hyaline cell and larger laminal cells. A critical evaluation of these characters revealed that these differences are obsolete. Therefore both species are synonymised with the result, that L. flexifolium has a disjunct range between the oceanic parts of Europe and the Alps, a distribution pattern also found in several other species,

The collection of specimens of "Leptodontium styriacum" in the Hohen Tauern (Austrian Alps) in August 2012 by the author drew the attention on the taxonomic value of this species. In this case, the hyaline cell and the apex of the leaves characteristic for this species was not present as well as the gemmae described as typical for L. styriacum with the consequence that this specimen keyed out to L. flexifolium.

Leptodontium styriacum was described by Juratzka and Geheeb in 1878 from Steiermark, Austria. This is relatively late considering that the bryofloristic exploration of the Alps started as early as in the begin of the 19. century, which may indicate the rarity of this species. Limpricht (1888), who transferred Didymodon styriacus to Leptodontium, distinghuishes L. flexifolium by "small" laminal cells and lacking gemmae from L. styriacum with "larger" cells and stem borne gemmae. In the text, he indicates the size of the laminal cells of L. flexifolium with 10-14 µm and of L. styriacum with 15-18 µm.

Mönkemeyer (1927) distinguished both species by the presence or absence of brood bodies but relativizes this character this distinction by listing L. flexifolium under both couplets. In the text, he adds: "leaves longer and narrower as in L. flexifolium, but with elongate smooth terminal cell".

Frahm (2006) summarizes the differences by "leaf apex ending in a hyaline cell, gemmae frequent" and "Leaf apex without terminal cell, gemmae rarely present".

Specimens studied

Leptodontium styriacum. Austria, Kärnten, Maltatal, Aufstieg von der Kramerhütte zum Faschauner Eck, Schwab 9.9.1990; Innerfragant, Mölltal-Gletscherbahn, Abstieg zur Mittelstation 2550 m, Frahm 29.8.2012; Osttirol, Matrei, Messelingkogel, unterhalb des Grünen Sees 2050 m, Schwab 1.9.1986; Switzerland, Berner Oberland, Haslital, Guttannen an der Grimselpaßstraße 1300 m, Frahm 22.8.1979.

Leptodontium flexifolium. Germany, Nordrhein-Westfalen Kr. Siegen-Wittgenstein, NSG Buchheller S Burbach, Frahm 8.11.2010.

Evaluation

A critical evaluation of the character states reveals the following:

a. Hyaline terminal cell of leaf.

A study of several specimens of Leptodontium from the Alps (listed above) revealed no hyaline end cell (cf. fig. 5,6). The presence of a hyaline terminal cell may be caused by the habitat: The specimen in which the lack of hyaline apical cells got obvious to me was from a dripping rock; the specimen from Guttanen/Switzerland (fig. 5) grew on a wooden roof at lower elevation (1300 m). But also specimens from rotten grass tussocks (e.g. the specimen leg. Schwab) in the alpine have not such a hyaline cell (fig. 6), which does not mean that the species has no hyaline apical cell, but at least not generally.

b. Gemmae

Apparently, gemmae were not known in L. flexifolium before 1972. Zander (1972) describes gemmae of L. flexifolium as “obovoid, 45-55 x 70-130 µm, with mostly 3 transverse septa, born on short branching stalks on the stem”. I described gemmae of L. flexifolium as long and 5-8 celled, rarely with longitudinal walls (Frahm 1973). Rogeon & Schumacker reported gemmae from S. France and the British isles as short, 2-3 celled, and nearly always divided. Abramov and Abramova (1983) found axillary gemmae in the leaf angles, which were 3-5 celled but also longer. Apparently there is a broad variety in the number of cells and the shape. Thus, gemmae in L. flexifolium exist in contrast to the observations of the older authors, which makes no difference to L. styriacum. The gemmae of L. styriacum are not as frequent as indicated in the literature. All specimens listed in this study showed no gemmae, the specimens from low elevation (1300 m) as well from dripping rocks as well those from higher elevations and drier habitats (Juncus trifidus tussocks). They were described and illustrated by Limpricht (1988) as stalked, which shall not be doubted, although the lectotype has the gemmae stem borne and in leaf axils, demonstrating the variability.

c. Size of the laminal cells.

The diameter of the laminal cells varies between 12 and 15 µm in all specimens studied. Larger cells in specimens named as L. styriacum could not be confirmed. This is perhaps the reason that this character has later no more been mentioned.

Conclusion

The differentiating characters between Leptodontium styriacum and L. flexifolium as described in the literature are obsolete. Neither the terminal cells of the leaves nor the presence/absence of gemmae allow a safe identification. Certain differences exist in the size and shape of leaves (figs. 1,2), which may be attributed to the alpine habitat. This may also count for the variable serration of the leaf margins. Therefore Leptodontium styriacum is conspecific with L. flexifolium and not an endemic species of the Alps. All Leptodontium specimens from the Alps were apparently automatically named as L. styriacum.

Leptodontium flexifolium (Dicks. ex With.) Hampe in Lindb. Öfv. K. Vet. Akad. Förh. 21:227, 1864.

Bryum flexifolium Dicks. ex With., Syst. Arr. Brit. Pf. ed. 4,3:799, 1801.

Leptodontium styriacum (Jur. ex Geh.) Limpr. Laubm. Deutschl. 1:565, 1888, syn. nov.

Didymodon styriacus Jur. ex Geh. Rev. Bryol. 5 :29, 1878.

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Discussion

There will certainly be biometric differences between the populations of Leptodontium "styriacum" in the Alps and L. flexifolium in the lowlands as indicated by the different leaf shape in figs. 1-6. Every flowering plant species grown in the Alps and the lowland will demonstrate this. The lack of characters regarded typical for L. styriacum could be the reason that Geissler (1984) determined the specimen from Guttannen (fig. 5) collected at 1300 m as L. flexifolium. In spite of this publication, the distribution maps of the bryophytes from Switzerland (http://www.nism.uzh.ch/map/map_de.php) show no entries for L. flexifolium is but only for L. styriacum. The record from Guttannen is filed under L. styriacum. If the synoynmy of L. styriacum is not accepted, Switzerland would have two species of Leptodontium, L. flexifolium (in Guttannen) with broad leaves, no apical hyaline cell and no gemmae and L. styriacum (at higher elevations). The question is, however, whether L. styriacum is a good species and is it a species endemic in the Alps having evolved after the retreat of the ice shields during the past 10.000 years.

With the synonymization of L. styriacum, L.flexifolium is now disjunct between low elevations in western Europe and the Alps, which seems at first to be strange at but is a more frequent distribution pattern which is also found in other oceanic species such as Anastrepta orcadensis, Herbertus sendtneri, Mylia taylori, Anastrophyllum donnianum, Dicranodontium asperulum, D. uncinatum, Campylopus gracilis, C. atrovirens and others. All these species are also found outside Europe.

Literature

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Zander, R.H. 1972. Revision of the genus Leptodontium (Musci) in the New World. The Bryologist 75: 213-280.

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Fig. 1. Leptodontium flexifolium from Germany, NSG Buchheller.

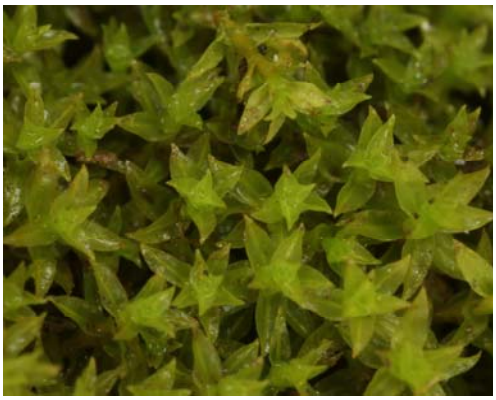

Fig. 2: Leptodontium styriacum from Austria, Mölltal.

Fig. 3: Leaf apex of fig. 1.

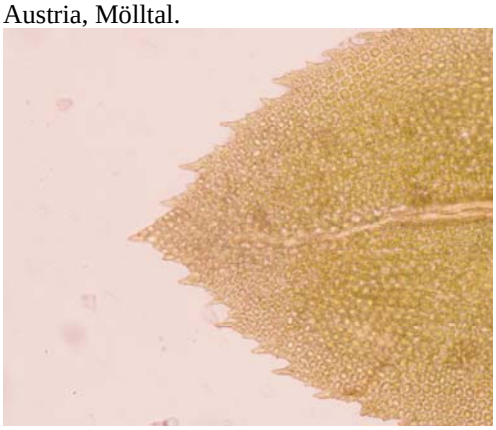

Fig. 4: as fig. 3, the terminal cell is a bit more pronounced.

Fig. 5: Leaf apex of L. styriacum, Switzerland, Guttannen. There is no hyaline terminal cell as in L. flexifolium and the leaf shape is intermediate between L. flexifolium and styriacum.

Fig. 6. Leaf apex of L. styriacum, Austria, Messelinkogel. There is no indication of a hyaline terminal cell.

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